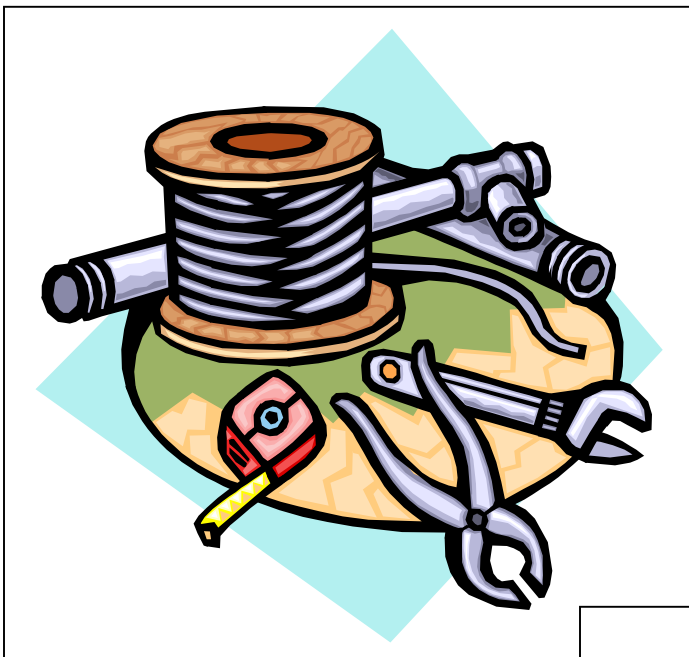
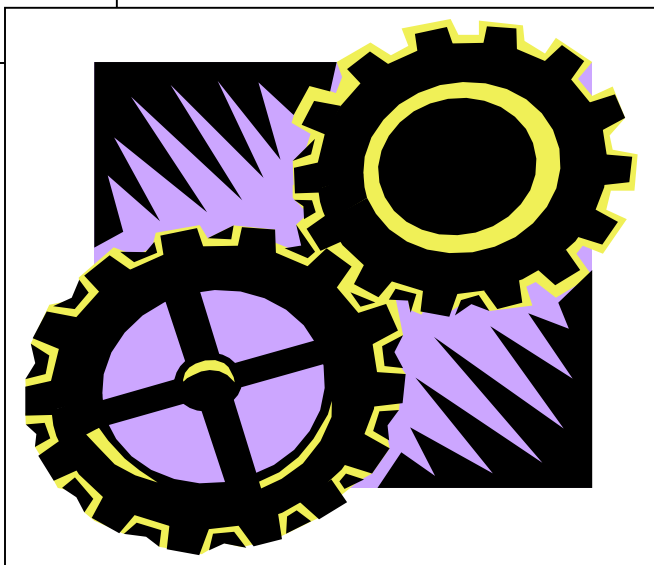


Installation, Maintenance, and Repair Occupations in Hawaii



April 2002

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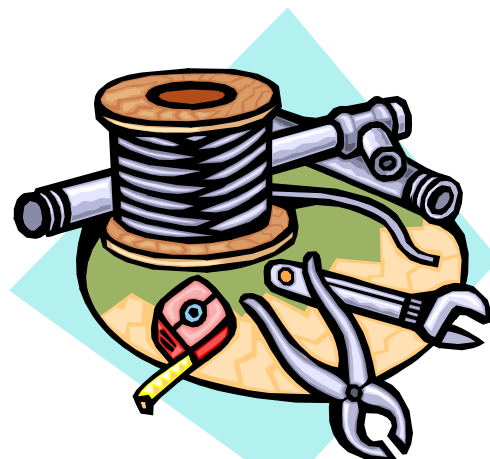


Installation, Maintenance, and Repair Occupations in Hawaii

By Sandra Wachi

April 2002

A career in installation, maintenance, and repair include occupations that install, maintain, and repair machines, wiring, mechanical equipment, and buildings, including work on plumbing, electrical, carpentry, air conditioning, and heating systems.



How many jobs?

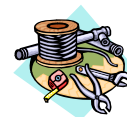
In 2000, there were approximately 18,840 installation, maintenance, and repair jobs in Hawaii. An estimated 73 percent of the jobs were in metropolitan Honolulu. Maui County accounted for about 12 percent, while Hawaii County had nearly 9 percent, and Kauai County with 6 percent.

General maintenance and repair workers was the largest occupation with 5,000 jobs, followed by automotive service technicians and mechanics with 2,140 jobs and first-line supervisors with 1,710 jobs.

Employment of Ten Largest Installation, Maintenance, and Repair Occupations

<u>Occupation</u>	<u>2000 Employment</u>
General Maintenance and Repair Workers	5,000
Automotive Service Technicians and Mechanics	2,140
First-Line Supervisors of Mechanics, Installers, Repairers	1,710
Bus and Truck Mechanics and Diesel Engine Specialists	940
Aircraft Mechanics and Service Technicians	840
Automotive Body and Related Repairers	740
Computer, Automated Teller, and Office Machine Repairers	680
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	640
Telecommunications Equipment Installers and Repairers	600
Helpers, Installation, Maintenance, and Repair Workers	450

Will there be jobs?



About 2,260 installation, maintenance, and repair jobs will be generated during 1998 to 2008. On an annual basis, 800 job openings are forecasted, with 230 openings due to growth and another 570 created by separations; that is positions that become available due to retirement, death, or employees leaving the labor force for other reasons.

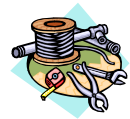
As expected, more than two-thirds of the job openings will be in Honolulu MSA. About 100 job openings are forecasted annually for Maui County, whereas Hawaii County will have around 70 jobs generated and about 50 openings slated for Kauai County.

<u>Occupation</u>	<u>Projected Employment Growth</u>		<u>Average Annual Job Openings</u>		
	<u>Number</u>	<u>Percent</u>	<u>Growth</u>	<u>Separations</u>	<u>Total</u>
General Maintenance and Repair Workers	680	10.4	70	150	220
Automotive Service Technicians and Mechanics	350	12.8	30	70	100
Heating, Air Conditioning and Refrigeration Mechanics and Installers	200	21.7	20	20	40
Helpers, Installation, Maintenance, and Repair	160	17.0	20	40	60
First-Line Supervisors and Managers	110	5.3	10	60	70
Telecommunications Line Installers and Repairers	110	27.5	10	10	20
Mobile Heavy Equipment Mechanics	100	17.2	10	20	30
Aircraft Mechanics and Service Technicians	90	9.3	10	20	30
Bus and Truck Mechanics and Diesel Engine Specialists	40	6.5	*	10	10
Computer, Automated Teller, and Office Machine Repairers	30	7.0	*	10	10
Telecommunications Equipment Installers and Repairers	20	11.8	*	10	10
Automobile Body and Related Repairers	10	1.9	*	20	20
TOTAL	2,260	9.8%	230	570	800

Note: * Less than 10.



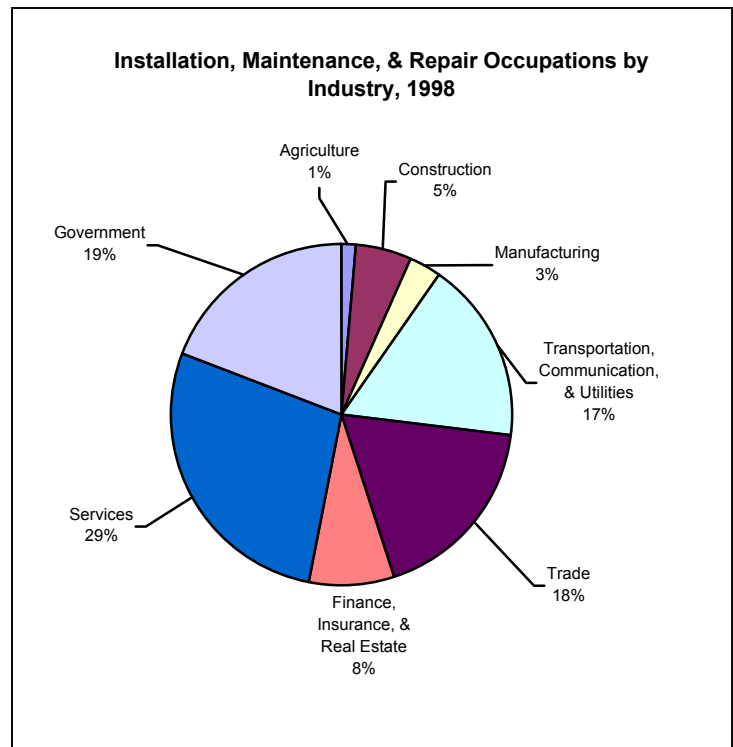
General maintenance and repair workers are projected to have the most job openings statewide over the ten year duration, growing at 10.4 percent, slightly faster than the average rate of all installation, maintenance, and repair occupations. About 220 job openings statewide are expected yearly in general maintenance and repair. Nearly two-thirds of the openings are projected to be in Honolulu MSA. Automotive service technicians and mechanics follow with 100 job openings. Although fewer in number, tele-communications line installers and re-pairers are predicted to grow at the fastest rate of 27.5 percent during the ten year span.



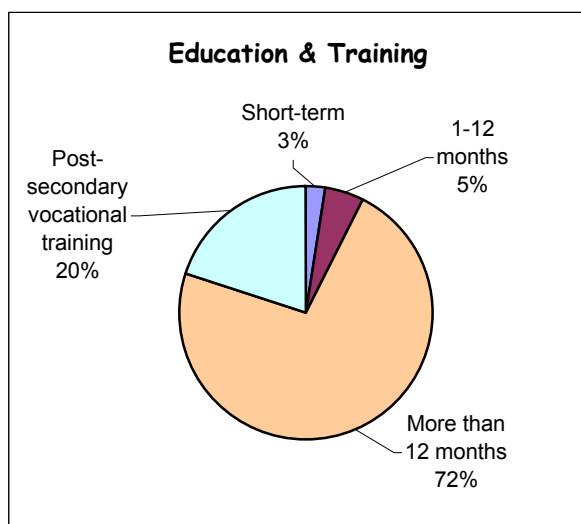
Where are the jobs?

In 1998, more than one-fourth of the installation, maintenance, and repair jobs were in the services industry. Many workers were employed at hotels and establishments that provide services including building maintenance; computer programming, data processing, and related services; automotive repair; electrical and electronic repair shops; and hospitals.

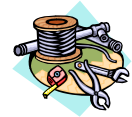
About 55 percent of the installation, maintenance, and repair workers were employed in government, trade, and transportation, communication, and utilities. The work involved automotive repair, building maintenance, diesel mechanics, and the installing and repairing of electrical, electronic, or industrial machinery.



Education and training



Most installation, maintenance, and repair occupations require some type of education and training beyond high school. A vast majority of the jobs require more than 12 months of on-the-job training or a combined work experience and formal classroom instruction before developing the skills needed for average job performance. Others may require post-secondary vocational training that involve job-related programs that may or may not result in a degree and may take up to four years to complete. However, some workers may acquire skills and experience from another occupation or military service.

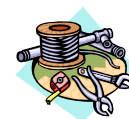


Average wages

Jobs in installation, maintenance, and repair tend to pay higher than the average wage of all occupations in Hawaii. According to the 2000 Occupational Employment Statistics survey, installation, maintenance, and repair workers were paid an average of \$18.83, which was nearly 25 percent higher than the average state wage of \$15.40 for all occupations. Average wages in Honolulu MSA were highest among the counties at \$19.62, while they were nearly identical in Hawaii and Kauai counties at \$16.81 and \$16.80, respectively. In Maui County, installation, maintenance, and repair workers were paid an average of \$16.47.

Statewide, electrical power-line installers and repairers were paid the highest wages, receiving an average hourly pay of \$30.42. At the opposite end, bicycle repairers averaged \$8.24 per hour. The largest occupation, general maintenance and repair workers, were paid an average of \$16.05 per hour. Average wages for selected occupations in installation, maintenance, and repair are displayed in the following table.

<u>Occupation</u>	<u>2000 Average hourly wage</u>
INSTALLATION, MAINTENANCE, AND REPAIR OCCUPATIONS	\$18.83
Electrical Power-Line Installers and Repairers	\$30.42
First-Line Supervisors and Managers of Mechanics, Installers, and Repairers	\$26.11
Telecommunications Line Installers and Repairers	\$24.18
Mobile Heavy Equipment Mechanics, Ex. Engines	\$22.75
Telecommunications Equipment Installers and Repairers, Ex. Line Installers	\$22.07
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$21.73
Aircraft Mechanics and Service Technicians	\$21.49
Industrial Machinery Mechanics	\$19.01
Bus and Truck Mechanics and Diesel Engine Specialists	\$18.51
Automotive Body and Related Repairers	\$18.33
Computer, Automated Teller, and Office Machine Repairers	\$16.21
General Maintenance and Repair Workers	\$16.05
Automotive Service Technicians and Mechanics	\$15.74
Locksmiths and Safe Repairers	\$14.21
Helpers, Installation, Maintenance, and Repair Workers	\$11.15
Tire Repairers and Changers	\$10.60
Electronic Equipment Installers and Repairers, Motor Vehicles	\$9.82
Bicycle Repairers	\$8.24



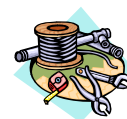
Do you have these skills?

Certain skills are considered very important to be successful in installation, maintenance, and repair. Workers must acquire skills that include repairing machines, installing equipment, performing routine maintenance, troubleshooting, identifying problems, and inspecting and evaluating products.

First-line supervisors and managers supervise and coordinate the activities of mechanics, installers, and repairers. They must have skills to coordinate, manage the resources of personnel, display time management, writing and speaking abilities, monitor and identify problems, implement planning, identify key causes, and manage financial resources.

Specific skills for selected occupations are listed in the following table in order of importance and ranked by importance.

Skills	General Maintenance & Repair Workers	Automotive Service Technicians & Mechanics	Helpers, Installation, Maintenance, & Repair Workers	Telecommunications Equipment Installers & Repairers	Bus & Truck Mechanics & Diesel Engine Specialists	Aircraft Mechanics & Service Technicians
Repairing: Repairing machines or systems using the need tools.	2	1		2	1	2
Equipment Maintenance: Performing routine maintenance and determining when and what kind of maintenance is needed.	3	4	1		2	1
Troubleshooting: Determining what is causing an operating error and deciding what to do about it.	5	2		3	3	5
Equipment Selection: Determining the kind of tools and equipment needed to do a job.				6		7
Problem Identification: Identifying the nature of problems	4	3		4		8
Testing: Conducting tests to determine whether equipment, software, or procedures are operating as expected.				5		3
Installation: Installing equipment, machines, wiring, or programs to meet specifications.	1	5		1		
Operation Monitoring: Watching gauges, dials, or other indicators to make sure a machine is working properly.						4
Reading Comprehension: Understanding written sentences and paragraphs in work related documents.						6



What you need to know

Installation, maintenance, and repair workers will need certain knowledge to be able to perform the job. It is very important for installers, maintenance workers, and repairers to have mechanical knowledge. The knowledge of machines and tools, along with their designs, uses, and benefits facilitate the repair and maintenance of machines and equipment.

First-line supervisors and managers must also have mechanical knowledge in addition to knowledge of administration and management that are considered important for strategic planning, resource allocation, manpower modeling, leadership techniques, and production methods.

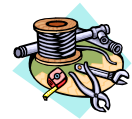
Knowledge considered very important are listed in the following table in order of importance and ranked by importance for selected occupations.

Knowledge	General Maintenance & Repair Workers	Automotive Service Technicians & Mechanics	Helpers, Installation, Maintenance, & Repair Workers	Telecommunications Equipment Installers & Repairers	Bus & Truck Mechanics & Diesel Engine Specialists	Aircraft Mechanics & Service Technicians
Mechanical: Knowledge of machines and tools, including their designs, uses, benefits, repair, and maintenance.	2	1	1		1	1
Building and Construction: Knowledge of materials, methods, and the appropriate tools to construct objects, structures, and buildings.	1					
Computers and Electronics: Knowledge of electric circuit boards, processors, chips, and computer hardware and software, including applications and programs.				1		
Telecommunications: Knowledge of transmission, broadcasting, switching, control, and operation of telecommunications systems.				2		

Work abilities

Installation, maintenance, and repair workers need specific abilities to be successful in their job. Workers must have the ability to recognize when there is a problem. They must be able to follow a given set of rules in order to arrange things or actions in a certain order and be able to quickly make coordinated hand movements to grasp, manipulate, or assemble objects.

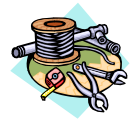
Oral expression is an important ability for first-line supervisors and managers to communicate information and ideas in speaking so others will understand.



It is important for telecommunications equipment installers and repairers to have the ability to tell when something is wrong or is likely to go wrong. They may also need manual dexterity, or the ability to quickly make coordinated movements of their hands to grasp, manipulate, or assemble objects.

Abilities considered very important are listed in the following table in order of importance and ranked by importance for selected occupations.

Abilities	General Maintenance & repair Workers	Automotive Service Technicians & Mechanics	Helpers, Installation, Maintenance & Repair Workers	Bus & Truck Mechanics & Diesel Engine Specialists	Aircraft Mechanics & Service Technicians
Information Ordering: The ability to correctly follow a given rule or set of rules in order to arrange things or actions in a certain order. The things or actions can include numbers, letters, words, pictures, procedures, sentences, and mathematical or logical operations.	1	1	1		
Visualization: The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.	2	3			
Manual Dexterity: The ability to quickly make coordinated movements of one hand, a hand together with its arm, or two hands to grasp, manipulate, or assemble objects.	3	4			
Finger Dexterity: The ability to make precisely coordinated movements of the fingers of one or both hands to grasp, manipulate, or assemble very small objects.	4	9			
Control Precision: The ability to quickly and repeatedly make precise adjustments in moving the controls of a machine or vehicle to exact positions.	5	7			3
Problem Sensitivity: The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.	6	2		1	1
Extent Flexibility: The ability to bend, stretch, twist, or reach out with the body, arms, and/or legs.	7	5			
Arm-Hand Steadiness: The ability to keep the hand and arm steady while making an arm movement or while holding the arm and hand in one position.	8	8			
Hearing Sensitivity: The ability to detect or tell the difference between sounds that vary over broad ranges of pitch and loudness.		6			
Static Strength: The ability to exert maximum muscle force to lift, push, pull, or carry objects.	9				
Visual Color Discrimination: The ability to match or detect differences between colors, including shades of color and brightness.	10				
Deductive Reasoning: The ability to apply general rules to specific problems to come up with logical answers. It involves deciding if an answer makes sense.					2



Licensing

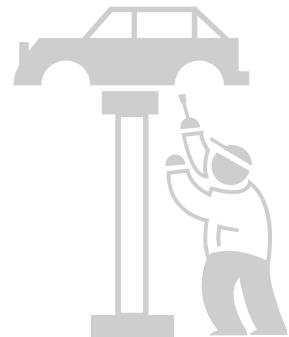
Automotive mechanics and elevator mechanics are the two occupations within the installation, maintenance, and repair career cluster that are regulated in the State of Hawaii.

To obtain a license for an **automotive mechanic**, you must have:

1. At least 2 years full-time hands-on working experience.
2. Credit for up to 1 year of the 2-year work experience requirement may be received by substituting relevant formal training in one, or a combination, of the following:
 - a) 3 full years of high school training;
 - b) 2 full years of post-high school training in a public or private trade school, technical institute, community or 4-year college, or in an apprenticeship program;
 - c) 2 months of short course post-high school training substitutes for 1 month of work experience.
3. Credit for the 2-year work experience requirement may be received with the completion of either a 3- or 4-year bona fide apprenticeship program.

The Automotive Service Excellence (ASE) examination must be taken. Fees include \$10 for application, \$26 for exam registration, \$21 for each test, \$60 for 2-year license, and \$110 for biennial compliance resolution fund. A license renewal every 2 years is \$40. A fee of \$10 is to add a category to current mechanic licenses.

In 2000, there were 110 new licenses issued for automotive mechanics. As of August 15, 2001, there were 2,119 automotive mechanic licenses currently active in Hawaii.

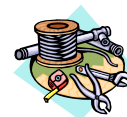


To obtain a license for an **elevator mechanic**, you must:

1. Be at least 18 years of age.
2. Have "Experience Verification" form signed by a licensed elevator mechanic(s) evidencing satisfactory completion of 2 years of training under their supervision.

An examination developed and administered by Experior Assessments, LLC (fka NAI). Fees include \$40 for application, \$70 for exam paid directly to Experior Assessments, \$100 for 2-year license, and \$70 for biennial compliance resolution fund. A license renewal every 2 years is \$100.

In 2000, only one new license was issued for elevator mechanics. As of August 15, 2001, there were 207 elevator mechanic licenses currently active in Hawaii.



Sources

State of Hawaii Employment Outlook for Industries and Occupations, 1998-2008, Hawaii State Department of Labor and Industrial Relations, Research and Statistics Office

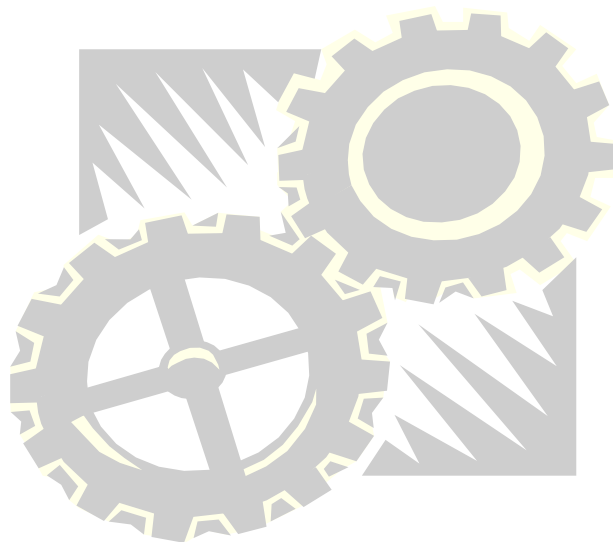
Standard Occupational Classification Manual 2000, Executive Office of the President, Office of Management and Budget

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2000 State of Hawaii Occupational Employment and Wage Estimates, U.S. Department of Labor, Bureau of Labor Statistics, web site: http://stats/bls.gov/oes/2000/oes_hi.htm

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Licensed Occupations in Hawaii, Labor and Occupational Information Hawaii (LOIHI), web site: www.loihi.state.hi.us



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